PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 12002008WO	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US03/07490	International filing date *(day/month/year)* 13 March 2003 (13.03.2003)	Priority date *(day/month/year)* 15 March 2002 (15.03.2002)
International Patent Classification (IPC) or national classification and IPC IPC(7): C08K 3/00, 5/24, 5/57 and US Cl.: 524/425, 269, 180		
Applicant POLYONE CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of ___ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
13 October 2003 (13.10.2003)	30 July 2004 (30.07.2004)
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703)305-3230	Authorized officer David W. Wu Telephone No. (703) 308-2351

Form PCT/IPEA/409 (cover sheet)(July 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/07490

I. Basis of the report

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed.

☒ the description:
pages 1-23 as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

☒ the claims:
pages 24 and 25, as originally filed
pages NONE, as amended (together with any statement) under Article 19
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

☒ the drawings:
pages none, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

☐ the sequence listing part of the description:
pages NONE, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination(under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages none

☐ the claims, Nos. none

☐ the drawings, sheets/~~fig~~ none

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*
*** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/07490

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. STATEMENT

Novelty (N)	Claims	3,5-7,9,10 and 12	YES
	Claims	1,2,4,8 and 11	NO
Inventive Step (IS)	Claims	NONE	YES
	Claims	1-12	NO
Industrial Applicability (IA)	Claims	1-12	YES
	Claims	NONE	NO

2. CITATIONS AND EXPLANATIONS
Please See Continuation Sheet

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

modify Funk's poly(vinyl chloride) composition by replacing with Caribbean calcium carbonate based upon their functional interchangeability as taught by Lamond with expectation of success, such a replacement will not only keep the heat stabilization on molding process, but also get an extra advantage due to the nature of calcium carbonate from Caribbean since it will allow higher stabilization on humidity change, thereby result no or less viscosity increase during the molding process. Regarding Claims 6-7, the reference Funk is silent about (A) including organotin stabilizer, and (B) including scavenger such as zinc dialkyl ester. Hung et al. teach both compounds in (A) and (B) can be also included in a heat stabilizer-containing poly(vinyl chloride) composition (column 5, line 37 – column 9, line 52), the advantage is to prevent decomposition of the polymer during the process procedure to be molded, calendered and extruded (column 9, line 38-42). Regarding Claims 9-10, Hung et al. teach PMMA can be also included as a blend with poly(vinyl chloride) with benefit specifically cited on column 4, line 53 - column 5, line 35 (column 4, line 46-52).

Claim 5 lack an inventive step under PCT Article 33(3) as being obvious over Funk et al. (US 4,213,487) in view of Higgs et al. (US 5,880,177). the Funk reference is silent about calcium carbonate is surface treated with a stearate. Higgs et al. teach inorganic particulate can be surface-treated with a hydrophobising surface treatment agent such as stearic acid or its salts (column 3, line 1-7), the advantage is such surface-modified inorganic particulate is suitable to be incorporated in a composition comprising a hydrophobic polymeric material due to better compatibility (abstract, line 1-6). Therefore, one having ordinary skill in the art would found it obvious to modify Funk's poly(vinyl chloride) composition by including a stearate-treated Caribbean calcium carbonate as taught by Higgs with an advantage as such modified calcium carbonate will be more suitable to be incorporated in a composition comprising the hydrophobic poly(vinyl chloride) due to better compatibility between polymer and filler, thereby one would expect to obtain molding articles with better performance due to a homoheneous, consistent and controllable molding procedure.

Claims 1-4 and 6-12 lack an inventive step under PCT Article 33(3) as being obvious over Lehr (US 4,711,921) in view of Hung et al. (US 5,100,946) and Lamond (US 5,102,465). The reference Lehr et al. disclose stabilization of vinyl chloride polymers with barium carbonate or cadmium carbonate used alone or both (column 1, line 49-56) to permit the compound to be used in processing techniques that require the composition to be heated to moderately high temperatures such as product forming by injection molding. Lehr et al. further disclose the process can be applied to homopolymer of vinyl chloride, or its copolymer with other co-polymerizable mono-olefin or vinyl-type co-monomers such as styrene or ethylene (column 1, lines 38-46 and 49-56; column 2, lines 17-38). Regarding Claims 1 and 3, Lehr is silent about using non-precipitated, sedimentary chalk-like calcium carbonate. Hung et al. teach halogen-containing polymer such as poly(vinyl chloride) can be stabilized by including one or more metal-containing heat stabilizers wherein the metal can be calcium, barium or cadmium (column 1, line 35-39; abstract, line 1-5). The advantage is the existence of such a heat stabilizer will allow heating up to 250 oC for processing without deterioration or decomposition (column 1, line 19-23). Lamond teaches dry ground calcium carbonate from Caribbean micritic limestone can be included as a filler in polymer moldings, the advantage is the composition will be less sensitive to variations in relative humidity and will not promote premature viscosity increase during the molding (abstract, line 1-6). In light of the fact that the functional equivalence among carbonates of calcium, barium and cadmium as well as the extra benefit by using a calcium carbonate from Caribbean, one having ordinary skill in the art would found it obvious to modify Lehr's poly(vinyl chloride) composition by replacing the heat stabilizer of barium carbonate or cadmium carbonate with calcium carbonate and further replacing with Caribbean calcium carbonate based upon their functional interchangeability as taught by both Hung and Lamond with expectation of success, such a replacement will not only keep the heat stabilization on molding process, but also get an extra advantage due to the nature of calcium carbonate from Caribbean since it will allow higher stabilization on humidity change, thereby result no or less viscosity increase during the molding process. Regarding Claims 6-7, the reference Lehr is silence about (A) including organotin stabilizer, and (B) including scavenger such as zinc dialkyl ester. Hung et al. teach both compounds in (A) and (B) can be also included in a heat stabilizer-containing poly(vinyl chloride) composition (column 5, line 37 – column 9, line 52), the advantage is to prevent decomposition of the polymer during the process procedure to be molded, calendered and extruded (column 9, line 38-42). Regarding Claims 9 and 10, Hung et al. teach PMMA can be also included as a blend with poly(vinyl chloride) with benefit specifically cited on column 4, line 53 - column 5, line 35 (column 4, line 46-52).

Claim 5 lack an inventive step under PCT Article 33(3) as being obvious over Lehr (US 4,711,921) in view of Hung et al. (US 5,100,946) and Lamond (US 5,102,465) as applied to Claims 1-4 and 6-12, and further in view of Higgs et al. (US 5,880,177). the references are silent about calcium carbonate is surface treated with a stearate. Higgs et al. teach inorganic particulate can be surface-treated with a hydrophobising surface treatment agent such as stearic acid or its salts (column 3, line 1-7), the advantage is such surface-modified inorganic particulate is suitable to be incorporated in a composition comprising a hydrophobic polymeric material due to better compatibility (abstract, line 1-6). Therefore, one having ordinary skill in the art would found it obvious to modify Lehr's poly(vinyl chloride) composition by including a stearate-treated Caribbean calcium carbonate as taught by Higgs with an advantage as such modified calcium carbonate will be more suitable to be incorporated in a composition comprising the

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

hydrophobic poly(vinyl chloride) due to better compatibility between polymer and filler, thereby one would expect to obtain molding articles with better performance due to a homoheneous, consistent and controllable molding procedure.

Response to the argument of April 5, 2004

Applicants have argued that in the written opioion (4 February 2003), Claims 1-2, 4, 6, 8 and 11-12 as being anticipated by US 4,711,921 (LEHR, Marvin H.) is incorrect. The examiner agrees with that Lehr only discloses the stabilization of vinyl chloride polymers can be improved with barium carbonate or cadmium carbonate, but is silent using calcium carbonate. Hung reference teaches that calcium, barium and cadmium are interchangeable as a heat stabilizer, while Lamond reference teaches using a specific calcium carbonate to prevent a premature viscosity. It is noted that Claim 1 does not restrict using calcium carbonate as a light stabilizer as pointed out by the Applicants. The examiner also gives a new set of rejections by using the Funk reference.

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

V. 2. Citations and Explanations:

The present claim is drawn to a weather resistant poly(vinyl chloride) compound, which comprising (a) poly(vinyl chloride) and (b) at least 2 wt% of essentially pure chalk-like calcium carbonate having a particle size less than 10 micron. It is noted that calcium carbonate may be from Jamaican, and may be surface treated with a stearate. Some organotin stabilizer and zinc dialkyl ester scavenger may be further added.

---------- NEW CITATIONS ----------

US 4,213,487 (FUNK et al) 22 July 1980, see column 1, lines 27-39; column 2, lines 30-50; column 5, line 60-62.

US 4,711,921 (LEHR, Marvin H.) 8 December 1987, see column 1, lines 38-46 and 49-56; column 2, lines 17-38.

US 5,100,946 (HUNG et al) 31 March 1992, see column 1, lines 19-23 and 35-39; abstract, lines 1-5; column 4, lines 46-63; column 5, line 37 - column 9, line 52.

US 5,102,465 (LAMOND, Trever G.) 7 April 1992, see abstract, lines 1-6.

US 5,880,177 (HiIGGS et al) 9 March 1999, see column 3, lines 1-7; abstract, lines 1-6.

Claims 1-2, 4, 8 and 11 lack novelty under PCT Article 33(2) as being anticipated by US 4,213,487 (FUNK et al). The reference Funk et al. disclose a thermoplastic laminate comprising poly(vinyl chloride) with a filler such as calcium carbonate up to 300 phr (column 1, line 49-56) to permit impermeability and weatherability (column 1, lines 27-39; column 2, lines 30-50; column 5, line 60-62). Lehr et al. further disclose the process can be applied to homopolymer of vinyl chloride, or its copolymer with other co-polymerizable mono-olefin or vinyl-type co-monomers such as styrene or ethylene. See column 1, lines 38-46 and 49-56; column 2, lines 17-38. As stated above, Claims 1-2, 4, 8 and 11 also lack an inventive step under PCT Article 33(3).

Claims 3, 6-7, 9-10 and 12 lack an inventive step under PCT Article 33(3) as being obvious over Funk et al. (US 4,213,487) in view of Hung et al. (US 5,100,946) and Lamond (US 5,102,465). Regarding Claim 3, Funk is silent about using Jamaican calcium carbonate. Lamond teaches dry ground calcium carbonate from Caribbean micritic limestone can be included as a filler in polymer moldings, the advantage is the composition will be less sensitive to variations in relative humidity and will not promote premature viscosity increase during the molding (abstract, line 1-6). Therefore, one having ordinary skill in the art would found it obvious to